

## PATENT COOPERATION TREATY

## PCT

## INTERNATIONAL PRELIMINARY EXAMINATION REPORT

(PCT Article 36 and Rule 70)

1-8  
REC'D 17 NOV 1999

WIPO PCT

|  |   |  |
|--|---|--|
| Applicant's or agent's file reference<br>P 98-290 LK/uh  | <b>FOR FURTHER ACTION</b> See Notification of Transmittal of International Preliminary Examination Report (Form PCT/IPEA/416) |  |
| International application No.<br>PCT/SE98/01736  | International filing date (day/month/year)<br>29.09.1998  | Priority date (day/month/year)<br>30.09.1997 |
| International Patent Classification (IPC) or national classification and IPC <sub>6</sub><br>H 02 K 3/40 |   |  |
| Applicant<br>ABB AB et al  |   |  |

1. This international preliminary examination report has been prepared by this International Preliminary Examining Authority and is transmitted to the applicant according to Article 36.
2. This REPORT consists of a total of 4 sheets, including this cover sheet.
- ☐ This report is also accompanied by ANNEXES, i.e., sheets of the description, claims and/or drawings which have been amended and are the basis for this report and/or sheets containing rectifications made before this Authority (see Rule 70.16 and Section 607 of the Administrative Instructions under the PCT).

These annexes consist of a total of \_\_\_\_\_ sheets.

3. This report contains indications relating to the following items:

- I ☒ Basis of the report
- II ☐ Priority
- III ☐ Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
- IV ☐ Lack of unity of invention
- V ☒ Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement
- VI ☐ Certain documents cited
- VII ☐ Certain defects in the international application
- VIII ☐ Certain observations on the international application

|  |   |
|--|---|
| Date of submission of the demand<br><br>26.04.1999   | Date of completion of this report<br><br>01.11.1999                         |
| Name and mailing address of the IPEA/SE<br>Patent- och registreringsverket<br>Box 5055<br>S-102 42 STOCKHOLM<br>Facsimile No. 08-667 72 88 | Authorized officer<br><br>Tomas Erlandsson/AE<br>Telephone No. 08-782 25 00 |

# INTERNATIONAL PRELIMINARY EXAMINATION REPORT

International application No.

PCT/SE98/01736

## I. Basis of the report

1. This report has been drawn on the basis of *(Replacement sheets which have been furnished to the receiving Office in response to an invitation under Article 14 are referred to in this report as "originally filed" and are not annexed to the report since they do not contain amendments.)*:

☒ the international application as originally filed.

☐ the description, pages \_\_\_\_\_, as originally filed,  
 pages \_\_\_\_\_, filed with the demand,  
 pages \_\_\_\_\_, filed with the letter of \_\_\_\_\_,  
 pages \_\_\_\_\_, filed with the letter of \_\_\_\_\_.

☐ the claims, Nos. \_\_\_\_\_, as originally filed,  
 Nos. \_\_\_\_\_, as amended under Article 19,  
 Nos. \_\_\_\_\_, filed with the demand,  
 Nos. \_\_\_\_\_, filed with the letter of \_\_\_\_\_,  
 Nos. \_\_\_\_\_, filed with the letter of \_\_\_\_\_.

☐ the drawings, sheets/fig \_\_\_\_\_, as originally filed,  
 sheets/fig \_\_\_\_\_, filed with the demand  
 sheets/fig \_\_\_\_\_, filed with the letter of \_\_\_\_\_,  
 sheets/fig \_\_\_\_\_, filed with the letter of \_\_\_\_\_.

2. The amendments have resulted in the cancellation of:

☐ the description, pages \_\_\_\_\_

☐ the claims, Nos. \_\_\_\_\_

☐ the drawings, sheets/fig \_\_\_\_\_

3. ☐ This report has been established as if (some of) the amendments had not been made, since they have been considered to go beyond the disclosure as filed, as indicated in the supplemental Box (Rule 70.2(c)).

4. Additional observations, if necessary:

# INTERNATIONAL PRELIMINARY EXAMINATION REPORT

International application No.

PCT/SE98/01736

## V. Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

### 1. Statement

|                               |        |             |     |
|-------------------------------|--------|-------------|-----|
| Novelty (N)                   | Claims | <u>1-39</u> | YES |
|                               | Claims | _____       | NO  |
| Inventive step (IS)           | Claims | <u>1-39</u> | YES |
|                               | Claims | _____       | NO  |
| Industrial applicability (IA) | Claims | <u>1-39</u> | YES |
|                               | Claims | _____       | NO  |

### 2. Citations and explanations

The claimed invention relates to a plant, an arrangement, the use of a plant and a method for synchronous phase compensation. The phase compensation is accomplished by means of a rotating electric machine with a special stator winding. The stator winding constitutes a flexible high voltage cable. The cable comprises a conductive core surrounded by two semiconducting layers and an intermediate insulating layer. By the use of a high voltage cable, a rotating electric machine can be connected to a power network without an intermediary transformer.

Documents cited in the International Search Report:

D1      US 4785138 A  
D2      US 4368418 A  
D3      US 5036165 A

D1 discloses an electric cable for use as phase winding for a linear motor. That cable is flexible (column 1, line 67 - column 2, line 19) and it includes a conductive core surrounded by two conducting layers and an intermediate insulating layer (fig. 2). Additionally, the outer conductive layer is provided with a conductive sheathing.

In D2 it is shown that it well known to use a rotating electric machine for phase compensation.

In D3 a cable comprising a conductive core surrounded by two semiconducting layers and an intermediate insulating layer is disclosed. That cable is, for all practical purposes, not suitable for using as a stator winding.

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INTERNATIONAL PRELIMINARY EXAMINATION REPORT

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**Supplemental Box**

(To be used when the space in any of the preceding boxes is not sufficient)

Continuation of: BOX V

Independent claims 1, 11, 38 and 39 relate to phase compensation by means of a rotating electric machine in which a high voltage cable is used as a stator winding. The cable disclosed in D1 has the same characteristics as the cable in claims 1, 11, 38 and 39. Since that cable is meant to be used as winding in a linear motor, it could be argued that it might be obvious to use it as winding in an ordinary rotating electric machine. However, that cable is used in linear motors, which means that the voltages are below 10 kV. It is not indicated in D2 that a cable for linear motors could be used for the higher voltages, 36 kV-800 kV, used in the rotating electric machines according to the claimed invention. It can not be considered obvious for a person skilled in the art to use a high voltage cable as a stator winding in a rotating electric machine, then use that machine for phase compensation and then additionally realise that such high voltages could be applied that the machine could be directly connected to a power network without using an intermediary transformer. Consequently, the invention according to claims 1, 11, 38 and 39 is considered to involve an inventive step.

The invention according to claims 1-39 is new, is considered to involve an inventive step and has industrial applicability.

## INTERNATIONAL SEARCH REPORT

International application No.

PCT/SE 98/01736

## A. CLASSIFICATION OF SUBJECT MATTER

IPC6: H02K 3/40

According to International Patent Classification (IPC) or to both national classification and IPC

## B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC6: H02K

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

SE,DK,FI,NO classes as above

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

WPI

## C. DOCUMENTS CONSIDERED TO BE RELEVANT

| Category* | Citation of document, with indication, where appropriate, of the relevant passages                           | Relevant to claim No.                       |
|-----------|--|---|
| Y         | US 4785138 A (O. BREITENBACH ET AL.),<br>15 November 1988 (15.11.88), see the whole document<br>--           | 1-16, 19-22,<br>24, 28, 30-32,<br>35, 37-39 |
| Y         | US 4368418 A (F.P. DEMELLO ET AL.),<br>11 January 1983 (11.01.83), abstract<br>--                            | 1-16, 19-22,<br>24, 28, 30-32,<br>35, 37-39 |
| Y         | SU 955369 A (BEZCHASTNO G.A. ET AL.),<br>30 August 1982 <sup>*</sup> (30.08.82), figure 1,<br>abstract<br>-- | 14  |

☒ Further documents are listed in the continuation of Box C.
 ☒ See patent family annex.

\* Special categories of cited documents:

- "A" document defining the general state of the art which is not considered to be of particular relevance
- "E" earlier document but published on or after the international filing date
- "L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)
- "O" document referring to an oral disclosure, use, exhibition or other means
- "P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X" document of particular relevance: the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

"Y" document of particular relevance: the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art

"&" document member of the same patent family

Date of the actual completion of the international search

8 December 1998

Date of mailing of the international search report

11-12-1998

Name and mailing address of the ISA/  
Swedish Patent Office  
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## INTERNATIONAL SEARCH REPORT

International application No.

PCT/SE 98/01736

| C (Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT |   |   |
|---|---|---|
| Category*   | Citation of document, with indication, where appropriate, of the relevant passages                  | Relevant to claim No.                       |
| Y   | US 4429244 A (P.Z. NIKITIN ET AL.),<br>31 January 1984 (31.01.84), figure IV,<br>abstract<br><br>-- | 19-21                                       |
| A   | US 4091139 A (J.F. QUIRK), 23 May 1978 (23.05.78),<br>abstract<br><br>--                            | 1-16, 19-22,<br>24, 28, 30-32,<br>35, 37-39 |
| A   | US 4551780 A (M. CANAY), 5 November 1985<br>(05.11.85), abstract<br><br>--                          | 17, 18                                      |
| A   | US 5036165 A (R.K. ELTON ET AL.), 30 July 1991<br>(30.07.91), abstract<br><br>--<br>-----           | 1-16, 19-22,<br>24, 27, 30-32,<br>35, 37-39 |

**INTERNATIONAL SEARCH REPORT**  
Information on patent family members

03/11/98

International application No.

PCT/SE 98/01736

| Patent document<br>cited in search report | Publication<br>date | Patent family<br>member(s) | Publication<br>date |
|---|---------------------|----------------------------|---------------------|
| US 4785138 A                              | 15/11/88            | DE 3543106 A,C             | 11/06/87            |
| US 4368418 A                              | 11/01/83            | CA 1169125 A               | 12/06/84            |
|   |                     | EP 0076848 A               | 20/04/83            |
|   |                     | WO 8203734 A               | 28/10/82            |
| SU 955369 A                               | 30/08/82            | NONE                       |                     |
| US 4429244 A                              | 31/01/84            | CA 1167898 A               | 22/05/84            |
|   |                     | CH 663120 A,B              | 13/11/87            |
|   |                     | DE 3050139 T               | 25/03/82            |
|   |                     | FR 2473804 A,B             | 17/07/81            |
|   |                     | GB 2081523 A,B             | 17/02/82            |
|   |                     | JP 56501707 T              | 19/11/81            |
|   |                     | SU 961048 A                | 23/09/82            |
|   |                     | WO 8101775 A               | 25/06/81            |
| US 4091139 A                              | 23/05/78            | BE 846361 A                | 17/03/77            |
|   |                     | CA 1071480 A               | 12/02/80            |
|   |                     | CH 607251 A                | 30/11/78            |
|   |                     | DE 2641406 A               | 31/03/77            |
|   |                     | GB 1565696 A               | 23/04/80            |
|   |                     | JP 1047401 C               | 28/05/81            |
|   |                     | JP 52036783 A              | 22/03/77            |
|   |                     | JP 55041483 B              | 24/10/80            |
| US 4551780 A                              | 05/11/85            | AU 533597 B                | 01/12/83            |
|   |                     | AU 5094879 A               | 17/07/80            |
|   |                     | CA 1134901 A               | 02/11/82            |
|   |                     | CH 651975 A,B              | 15/10/85            |
|   |                     | DE 2903790 A               | 24/07/80            |
|   |                     | FR 2446553 A,B             | 08/08/80            |
|   |                     | SE 446289 B,C              | 25/08/86            |
|   |                     | SE 8000104 A               | 11/07/80            |
| US 5036165 A                              | 30/07/91            | US 5066881 A               | 19/11/91            |
|   |                     | US 5067046 A               | 19/11/91            |
|   |                     | CA 1245270 A               | 22/11/88            |
|   |                     | US 4853565 A               | 01/08/89            |

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## PATENT COOPERATION TREATY

PCT

NOTIFICATION OF THE RECORDING  
OF A CHANGE(PCT Rule 92bis.1 and  
Administrative Instructions, Section 422)

From the INTERNATIONAL BUREAU

To:

KARLSSON, Leif  
L.A. Groth & Co. KB  
P.O. Box 6107  
S-102 32 Stockholm  
SUÈDE

Date of mailing (day/month/year)

17 September 1999 (17.09.99)

Applicant's or agent's file reference

P 98-290/LK

International application No.

PCT/SE98/01736

## IMPORTANT NOTIFICATION

International filing date (day/month/year)

29 September 1998 (29.09.98)

1. The following indications appeared on record concerning:

☒

the applicant

☐

the inventor

☐

the agent

☐

the common representative

Name and Address

ASEA BROWN BOVERI AB  
S-721 83 Västerås  
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State of Nationality

SE

State of Residence

SE

Telephone No.

Facsimile No.

Teleprinter No.

2. The International Bureau hereby notifies the applicant that the following change has been recorded concerning:

☐

the person

☒

the name

☐

the address

☐

the nationality

☐

the residence

Name and Address

ABB AB  
S-721 83 Västerås  
Sweden

State of Nationality

SE

State of Residence

SE

Telephone No.

Facsimile No.

Teleprinter No.

3. Further observations, if necessary:

4. A copy of this notification has been sent to:

☒

the receiving Office

☐

the International Searching Authority

☒

the International Preliminary Examining Authority

☐

the designated Offices concerned

☒

the elected Offices concerned

☐

other:

The International Bureau of WIPO  
34, chemin des Colombettes  
1211 Geneva 20, Switzerland

Facsimile No.: (41-22) 740.14.35

Authorized officer

Ting Zhao

Telephone No.: (41-22) 338.83.38

# PATENT COOPERATION TREATY

## PCT

### NOTIFICATION OF ELECTION

(PCT Rule 61.2)

From the INTERNATIONAL BUREAU

To:

United States Patent and Trademark  
Office  
(Box PCT)  
Crystal Plaza 2  
Washington, DC 20231  
ÉTATS-UNIS D'AMÉRIQUE

in its capacity as elected Office

|   |   |
|---|---|
| <b>Date of mailing (day/month/year)</b><br>11 June 1999 (11.06.99)                |   |
| <b>International application No.</b><br>PCT/SE98/01736                            | <b>Applicant's or agent's file reference</b><br>P 98-290/LK           |
| <b>International filing date (day/month/year)</b><br>29 September 1998 (29.09.98) | <b>Priority date (day/month/year)</b><br>30 September 1997 (30.09.97) |
| <b>Applicant</b><br>LEIJON, Mats et al  |   |

1. The designated Office is hereby notified of its election made:

☒ in the demand filed with the International Preliminary Examining Authority on:

26 April 1999 (26.04.99)

☐ in a notice effecting later election filed with the International Bureau on:

2. The election ☒ was

☐ was not

made before the expiration of 19 months from the priority date or, where Rule 32 applies, within the time limit under Rule 32.2(b).

|  |   |
|--|---|
| <b>The International Bureau of WIPO</b><br>34, chemin des Colombettes<br>1211 Geneva 20, Switzerland<br><br>Facsimile No.: (41-22) 740.14.35 | <b>Authorized officer</b><br><br>Nicola Wolff<br><br>Telephone No.: (41-22) 338.83.38 |
|--|---|